

Cost and Benefit Analysis



*Choosing a SPI Method for Maximum
Return on Investment (ROI)*

David F. Rico

Overview



- Yesterday's Challenges
- Benefits
 - Various Methods
 - Personal Software Process (PSP)
 - Team Software Process (TSP)
 - Software Inspection Process
 - Six Sigma
- Tomorrow's Challenges
- Bottom Line!
- Author Info

Yesterday's Challenges

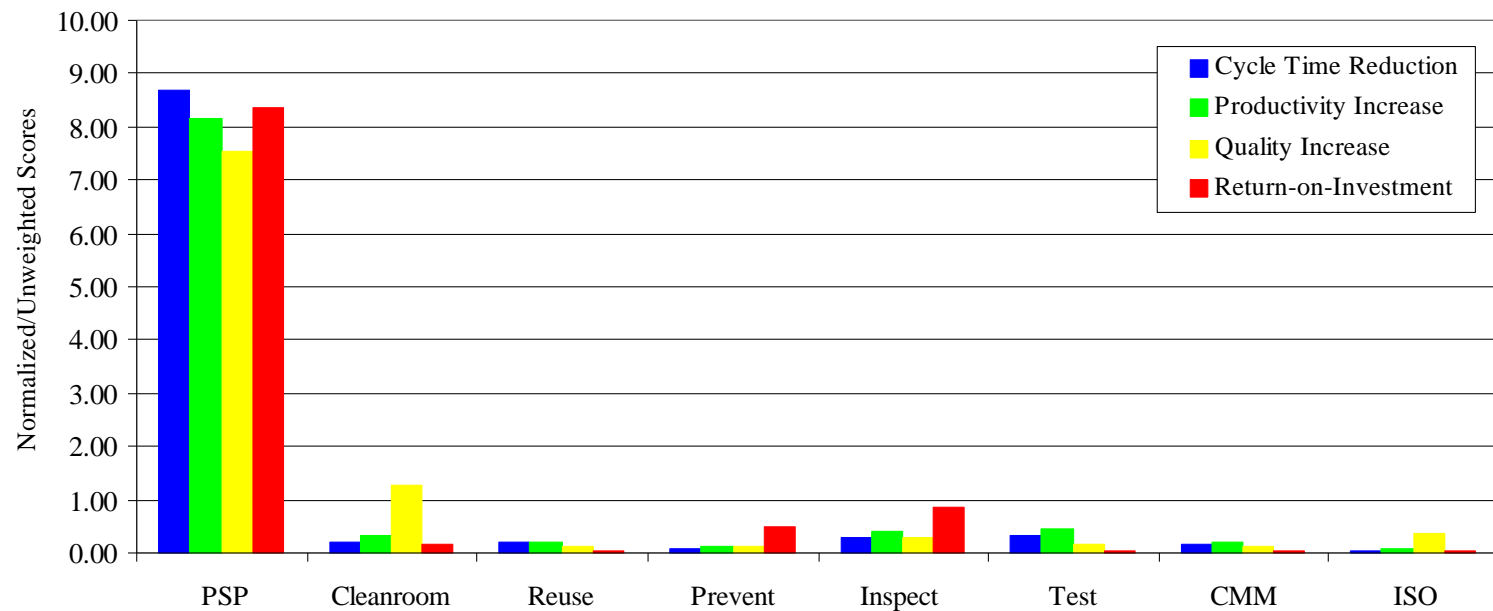


- Is SPI possible? → Yes!
- Is SPI worth it? → Yes!
- Does SPI have benefits? → Yes!
- Does SPI cost too much? → No!
- Does SPI take too long? → No!
- Is there one best SPI method? → No!
- Is SPI difficult? → Yes!
- Is SPI “only” for safety critical systems? → No!

Benefits

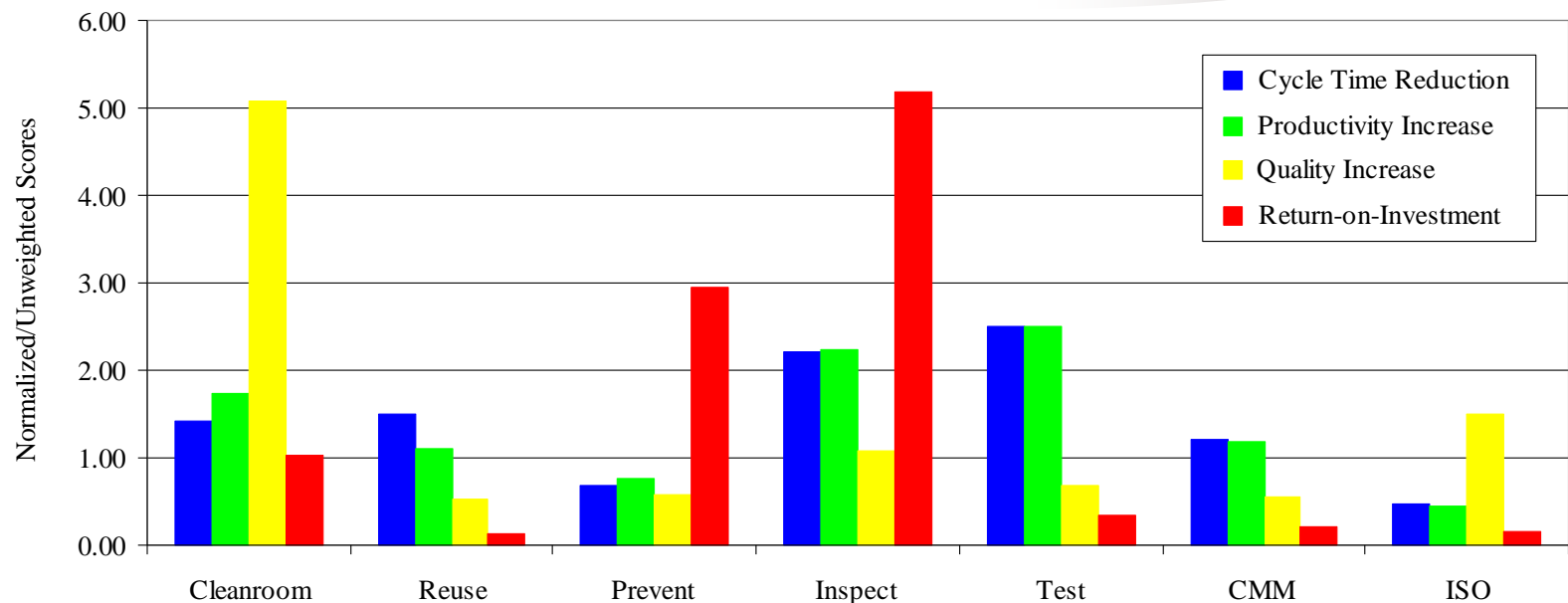


Various SPI Methods



Rico, David F., "Using Cost Benefit Analyses to Develop a Pluralistic Methodology for Selecting from Multiple Prescriptive Software Process Improvement (SPI) Strategies," <http://davidfrico.com> (1999)

Various SPI Methods (continued)



Rico, David F., "Using Cost Benefit Analyses to Develop a Pluralistic Methodology for Selecting from Multiple Prescriptive Software Process Improvement (SPI) Strategies," <http://davidfrico.com> (1999)

Personal Software Process (PSP)



QUALITY: 30 to 1 advantage over CMM/ISO

COST: 41 to 1 advantage over CMM/ISO

PRODUCTIVITY: 55 to 1 advantage over CMM/ISO

CYCLE TIME: 82 to 1 advantage over CMM/ISO

BREAKEVEN: 94 to 1 advantage over CMM/ISO

ROI: 258 to 1 advantage over CMM/ISO

ROI: 1,290 to 1 advantage over ad hoc methods

Rico, David F., "Personal Software Process (PSP): An Executive Overview, <http://davidfrico.com> (2000)

Team Software Process (TSP)

WHO: Electronic Brokering Services in London, England

SIZE: 65,000 lines of code (LOC) in Java

VOLUME: US \$100,000,000,000 trades per day

BENEFIT: Zero defects in use

Goth, Greg, "The Team Software Process: A Quiet Quality Revolution," IEEE Software (November/December 2000)

SEI Level 5



WHO: Computer Sciences Corporation in Washington D.C.

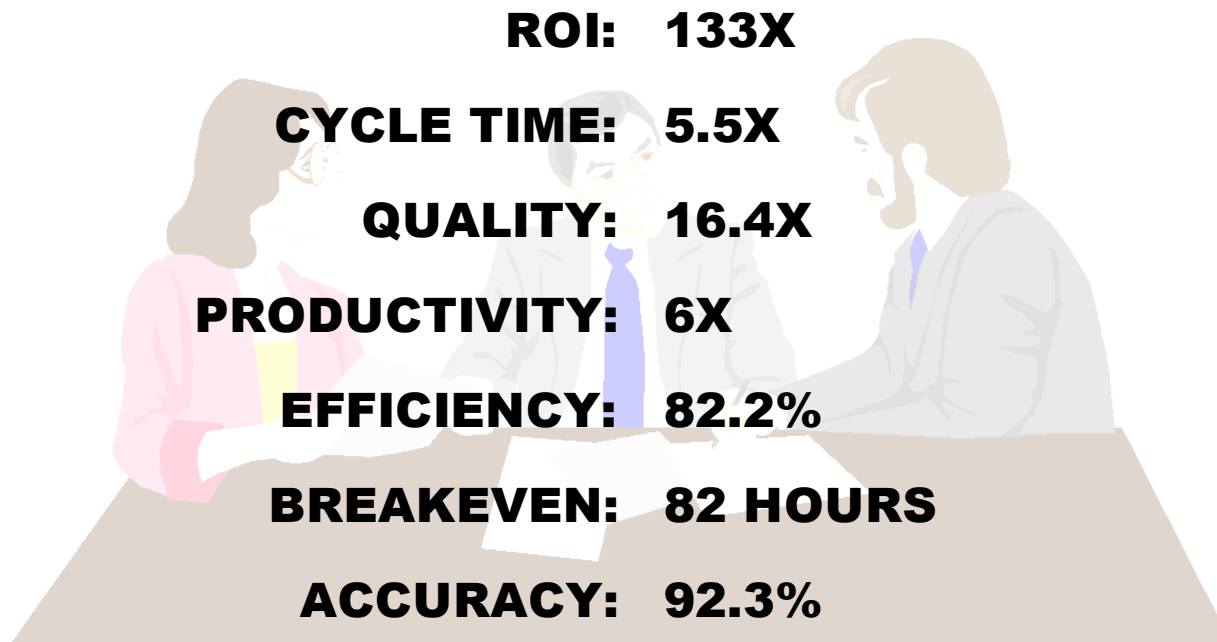
COST: US \$6,000,000

BENEFIT: US \$500,000,000 in new contracts

ROI: 83 to 1

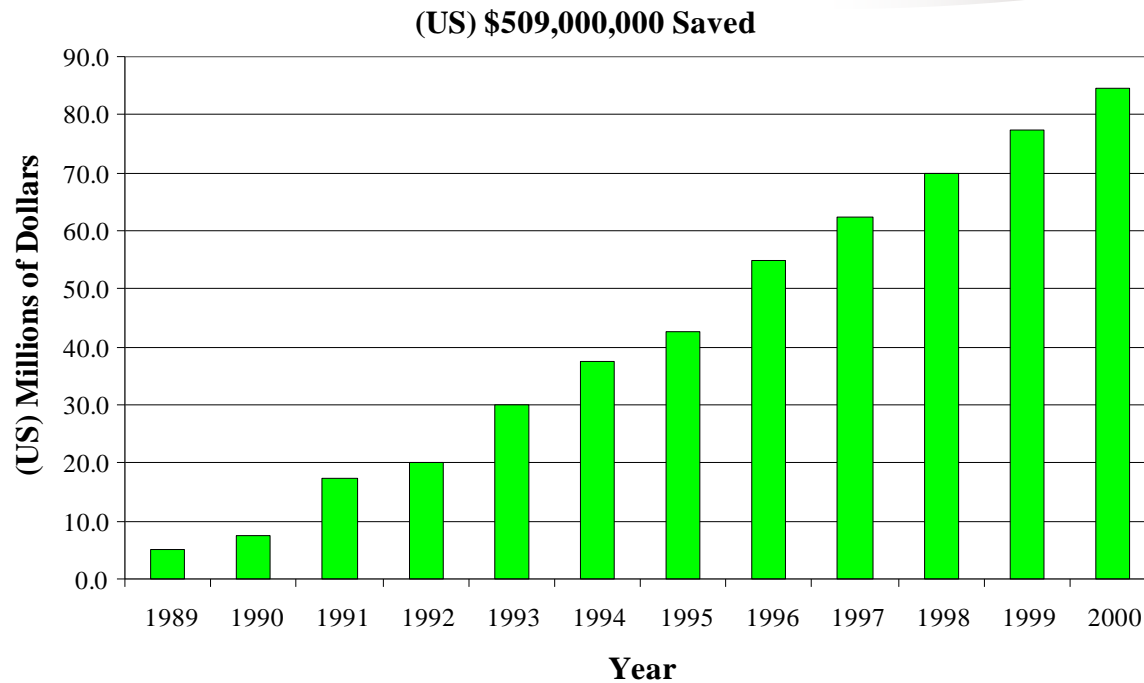
McGarry, Frank, "Experiences in Attaining Level 5 Process Maturity at CSC, Washington D.C. Society for Software Quality (SSQ) June 2000)

Software Inspection Process



Rico, David F., "Software Inspection Process: An Executive Overview, <http://davidfrico.com> (2000)

Software Inspection Process



Grady, Robert, "Successful Software Process Improvement, Prentice Hall (1997)

Six Sigma

WHO: Raytheon

4.0 SIGMA: US \$1,500,000,000 potential savings

5.5 SIGMA: US \$3,000,000,000 potential savings

6.0 SIGMA: US \$4,000,000,000 potential savings

Velocci, Anthony L., "High Hopes Riding on Six Sigma at Raytheon," Aviation Week & Space Technology (1998)

Six Sigma



WHO: Motorola

PRODUCTIVITY: 12.3% increase per year

COST: 84% reduction


QUALITY: Eliminated 99.7% of in-process defects

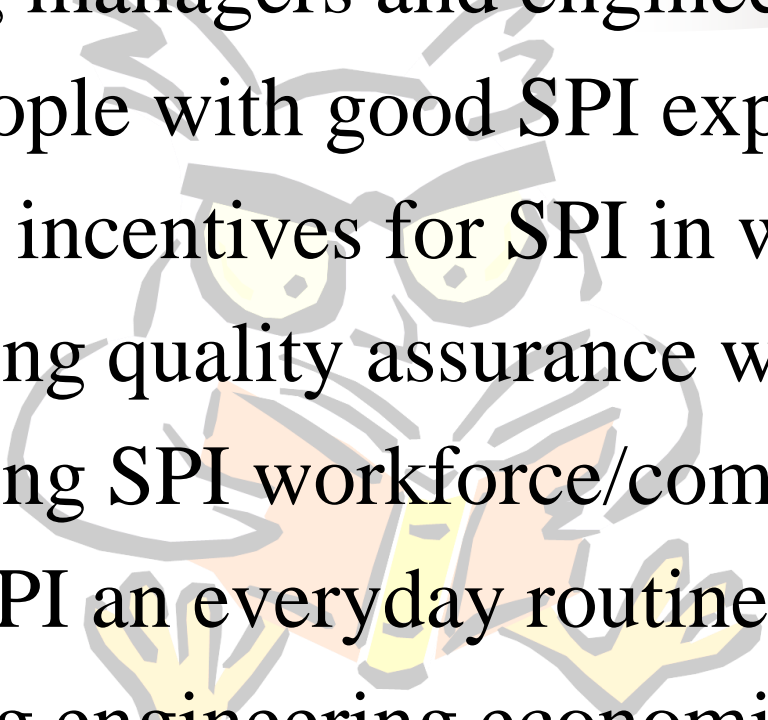
SAVINGS: US \$11,000,000,000

**EARNINGS: 17% annual growth in revenues, earnings,
and stock price**

Motorola, "Motorola University: Six Sigma Black Belt," <http://mu.motorola.com/SixSigma/SixSigma.html> (2001)

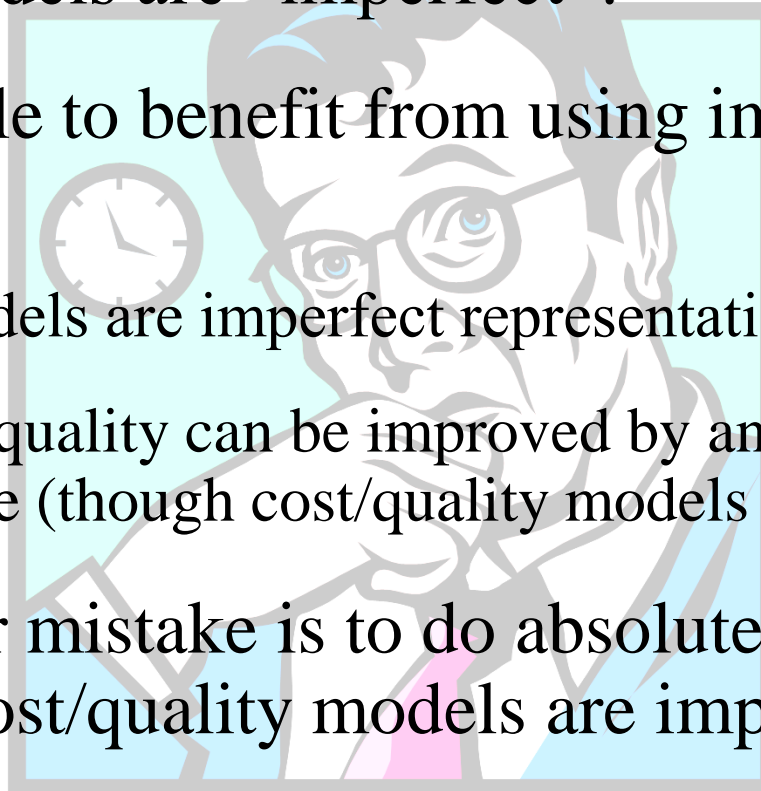
Tomorrow's Challenges



- Educating managers and engineers in SPI
 - Hiring people with good SPI experience
 - Providing incentives for SPI in workplace
 - Reeducating quality assurance workforce
 - Reeducating SPI workforce/community
 - Making SPI an everyday routine occurrence
 - Examining engineering economics everyday
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Bottom Line!

- Don't be “afraid” to try SPI because the methods and the models are “imperfect”!
- It is possible to benefit from using imperfect models!
 - “All” models are imperfect representations of reality.
 - Cost and quality can be improved by an order-of-magnitude (though cost/quality models are imperfect).
- The greater mistake is to do absolutely nothing (because cost/quality models are imperfect)!



Author Info



- Helped design a \$250 million software engineering environment, graphical user interface, and avionics software for NASA's \$20 billion space station
- Did graduate studies under SEI Level 5 NASA space shuttle managers (and participated in transferring SEI Level 5 practices to NASA space station and international clients)
- Helped Japan's largest computer corporation (\$40 billion Fujitsu) customize the SEI's Software CMM, get ISO 9000 registered, and contribute to ISO SPICE and ISO 12207
- Designed and deployed a custom software cost estimation methodology for all 37 kinds of U.S. Navy military aircraft (statistically analyzing 50 million source lines of code)
- Supported 13 SEI CMM software engineering process groups (SEPGs) over the last decade (specializing in designing SEI Level 2 thru 5 policies and procedures)
- Designed a popular software process improvement (SPI) website:
<http://davidfrico.com> (which gets 100,000 hits/month from 100+ countries)